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Editorial

Special issue on 'Multiaxial Fatigue 2013': Selected papers from the 10th International Conference on Multiaxial Fatigue and Fracture (ICMFF10), held in Kyoto, Japan, on 3–6 June 2013

This Special Issue of the International Journal of Fatigue contains selected papers presented at the International Conference on Multiaxial Fatigue and Fracture held in Kyoto, Japan, on 3–6 June 2013. This conference was the tenth in a successful series initiated by Keith J. Miller. The first conference was held in 1982 in San Francisco, USA. Subsequent conferences were held in Sheffield, UK (1985), Stuttgart, Germany (1989), St. Germain-en-Laye, France (1994), Cracow, Poland (1997), Lisbon, Portugal (2001), Berlin, Germany (2004), Sheffield, UK (2007), and Parma, Italy (2010).

Multiaxial fatigue and fracture of components and materials are subjects of concern to both engineers and researchers. This is because many engineering components and structures in the automotive, aerospace, power generation, and other industries are subjected to multiaxial stresses during their service life. Despite increased efforts in the understanding of multiaxial fatigue and fracture behaviour, failure assessment procedures are becoming more complex. Therefore, the aim of the conference was not only to review the progress made via a forum that included experimentalists, theoreticians, industrial practitioners, and academic experts, but also to illustrate how to apply research results to industrial practice.

This conference was an official European Structural Integrity Society (ESIS) conference. It was organised by Andrea Carpinteri (University of Parma), Masao Sakane (Ritsumeikan University) and Shan-Tung Tu (East China University of Science and Technology) as chairmen. Support for the conference organisation was also provided by Ritsumeikan University, University of Parma, The Society of Materials Science in Japan, European Structural Integrity Society, ASTM International-Standards Worldwide, German Association for Materials Research and Testing, French Society for Metallurgy and Materials, Italian Group of Fracture, MTS Systems Corporation, and Kobe Materials Testing Laboratory Co.

The conference provided an interactive forum with about 120 delegates from 19 countries. There were about 110 paper presentations, which were included in the proceedings of the conference issued to delegates on a memory stick. The papers presented included discussions on recent research results, and possible practical solutions. The presenters included academic scientists as well as industrial practitioners.

The selected papers for this special issue cover a wide range of topics discussed at the Kyoto conference. These topics include the effects of the following factors on the multiaxial fatigue behaviour of materials and structures: geometrical stress concentrations, defects, weldments, high-cycle and low-cycle fatigue loads, material microstructure, anisotropy, residual stresses, mean stresses, overloads, rolling contact, ratcheting, temperature, creep. The materials examined include metallic alloys and castings and composites. Practical considerations include methods of testing to determine service life under multiaxial fatigue loads. The selected papers have been revised and significantly extended by the authors and subjected to the normal IJF review process. Further selected papers from the conference are published in a Special Issue of Engineering Fracture Mechanics on 'Multiaxial Fracture 2013'.

While the diverse paper topics presented at the Kyoto conference illustrated the importance of multiaxial fatigue and fracture in today's engineering practice, it also demonstrated the need for further work over forthcoming decades. In anticipation of an improved understanding of multiaxial fatigue and fracture behaviour, with associated failure assessment procedures, the conference series will be continued in Seville, Spain (June 2016) and Bordeaux, France (June 2019).

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